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UNIVERSITY OF IDAHO
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DIRECTOR

GRADING THE IDAHO WHEAT CROP

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DEPARTMENT OF AGRONOMY

Cooperative Extension Service in Agriculture and Home Economics of the State of Idaho, University of Idaho, Extension Division,
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Unstinted use has been made of the various publications of the U. S. Department of Agriculture dealing with grain grading. Use was also made of the Washington Agricultural Experiment Station bulletin entitled, "Washington Wheats."

Thanks for valuable assistance and suggestions are due to Mr. H. A. Martin, Grain Supervisor of the U. S. Department of Agriculture; Prof. G. R. Hyslop of the Oregon Agricultural College, and Mr. J. A. Clark of the U. S. Department of Agriculture.

IDAHO
OFFICIAL WHEAT GRADES.

Beginning September 1, 1918, all trading in wheat in the State of Idaho must be based on the U. S. Official Wheat Grades, as promulgated by the Secretary of Agriculture.

A State Grain Inspector has been appointed who will grade such samples as are submitted to him as provided by the rules which follow below. The State Grain Inspector is also licensed by the U. S. Department of Agriculture and is subject to their supervision.

Dealers are permitted to buy wheat on the basis of Federal Grades without submitting samples to the State Grain Inspector. **In case of disagreement between buyer or seller; or upon demand of either of the parties concerned, a sample must be submitted to the State Grain Inspector for his official grade.**

The grade determined by the State Grain Inspector becomes the official grade of the lot of wheat represented by the given sample and settlement must be made on that basis. There is no appeal from a grade thus designated, but the grading will be reviewed upon payment of a second fee.

HOW TO OBTAIN STATE INSPECTION.

Selection of Sample: The Sample must be **jointly selected** by the buyer and the seller and **attested by both** to be representative of the lot of wheat from which selected.

Size of Sample: Three pints or more are necessary for an ordinary test. If a moisture test is desired, an **additional** one and one-half pints must be placed in an air-tight container and submitted with the rest of the sample.

The Declaration Sheet: Must be signed by both parties concerned and otherwise properly filled out. Dealers are **required** to keep a supply of such blanks on hand at all times. They are furnished at cost in lots of twenty-five by the State Grain Inspector.

Fee Required: A fee of one dollar must be included for every sample submitted. Postage stamps will **not** be accepted.

Where to Send Sample: Send the Sample to **State Grain Inspector, Boise, Idaho.** Postage or Express charges must be prepaid.

Dealers Are Required to Keep a Copy of This Notice in a Conspicuous Place.

Issued by the
State Farm Markets Department.
Harvey Allred, Director.

WHEAT GRADING SCHOOL AT POCATELLO.

A series of three such schools were held in Southern Idaho early in August, 1918. Grain dealers and farmers came from widely scattered areas for instruction. All phases of wheat grading were considered and actual demonstrations made. More such schools will be held.

Grading the Idaho Wheat Crop

By R. J. Leth, Field Agronomist.

(Recently appointed **State Grain Inspector** thru a co-operative agreement with the State Department of Farm Markets.)

Every man connected with the wheat industry is very definitely interested in the grades placed on his product. An error in the grade designation may easily transform a normal profit into an actual loss. To assist the farmer in deciding upon the wheat variety to grow and to aid the dealer in buying and mixing the various lots received, this bulletin has been prepared. It is felt that with a better understanding of the federal and state standards a better quality of wheat will be forwarded from the various local market points. With a purer and more uniform product must eventually come a better price for that product.

WHAT GRADES ARE.

Grades are merely arbitrary standards fixed by some agency having the proper power and authority. The present wheat grades were fixed by the U. S. Department of Agriculture under authority granted by an act of Congress. Many years were spent in studying and investigating the various types of wheat grown within the nation. As a result the wheats have been grouped in certain classes, each having definite milling values.

In the past the various wheat markets such as Minneapolis, Chicago and Portland had their individual systems of grading. There was no uniformity in the grades so established and any dealing among those markets had to be done on a sample basis. No close federal supervision was given and the shipper often felt he was not getting a square deal. To prevent any possible sharp practices and to provide uniform grades thruout the nation, the present system was adopted. Thru the authority conferred by the State Legislature on the Director of the State Department of Farm Markets, those federal standards were made effective within this state beginning September 1, 1918.

With the state and federal governments co-operating closely in the matter of wheat grading, much good should result. It is anticipated that few future changes will be made in the grades, thus making it possible for the farmer and the dealer to become fully acquainted with the important provisions. An

incentive, thru a higher price, should result in the marketing of purer and better wheat. This incentive has too often been lacking in the past.

Where only a few different grades are established it is possible to indicate the exact grade of only a portion of the wheat sold. Lots that are just below number one will naturally be more valuable than other lots making a similar grade with difficulty. By making an intermediate grade it would be possible to differentiate between such lots of wheat. This very addition of extra grades would complicate matters, however, and render the whole system impractical.

Ordinary human judgment has been eliminated as far as possible. Factors which can be measured accurately by mechanical instruments have been used almost entirely. If a "small amount" of wheat of other classes was allowed in number one, a great many variations would be found. One man's idea of a "small amount" would naturally differ greatly from that of other men. If, as the rules state, a 5 per cent mixture of other classes is allowed in number one, the question is decided once for all and human judgment is not a factor. This characteristic is very essential for the permanent success of any set of grades.

THE PROCESS OF GRADING WHEAT.

The problems which the average farmer or dealer faces in grading wheat consist of:

1. The selection of a representative sample.
2. The determination of the percentage of dockage and smut dockage.
3. The determination of the proper class and subclass. Under this heading the variety of wheat and the texture of the sample must be considered.
4. The assignment of the correct grade. Under this heading the test weight per bushel, wheat of other classes, moisture content, damaged kernels, and foreign material other than dockage are the determining factors.

SELECTION OF A REPRESENTATIVE SAMPLE.

Too much importance cannot be attached to this phase of the work. The sample, often many thousand times smaller than the lot it represents, decides the price to be paid for the wheat. Only a few kernels of a different class are needed to reduce the grade. More care is needed in this operation than in any other phase of the work.

Car Load Sampling. At least five probes should be taken in each car. If evidences of plugging are found, many more are necessary.

Wagon Load Sampling. Where the wheat is hauled loose in wagons or tanks, three probes with a trier or sampler should be sufficient for each load. If no triers are available, samples should be taken both at the top and at the bottom, as well as in the middle. Hauling over rough roads will allow the lighter material to work to the top, while the heavier kernels and pieces of broken kernels will settle to the bottom.

Sack Sampling. For accuracy every sack should be probed. Care should be taken to get the wheat in the middle as well as at the edges.

Where a farmer hauls a large number of loads a good plan is to sample every load as noted above when the wheat is delivered. These small individual samples are then placed together in a common sack and the grade on the whole lot determined after the hauling has been completed.

Mixing a Composite Sample. Great care is needed to insure representation of each subsample in the portion finally chosen for the grade designation. Thoro mixing cannot be made without removing the wheat from the bag. Spreading on a smooth level floor and mixing with a shovel is effective.

Selection of the Final Sample. The final sample should not be taken indiscriminately from the heap previously shovel mixed. The best plan is to pile the composite sample into a cone shaped heap. By means of a thin board or similar instrument the pile can readily be divided into four equal parts. Two cuts are made at right angles much the same as when a pie is cut into four pieces. One of the quarters should be saved and divided the same as the original sample. This process should be continued until a sample of the proper size for grading has been secured.

The above process may seem long and tedious, but it is necessary for accurate results. Unsatisfactory grade returns can very frequently be traced to careless or inadequate selection and mixing of the sample. This point is of the greatest importance.

A Manufactured Dividing Device is an excellent machine where the volume of business justifies the expense. A machine of this sort scientifically divides grain of all kinds; does it rapidly, and with absolute accuracy. The larger dealers can hardly afford to be without one.

Types of Grain Triers. Grain triers are made in different lengths from about five feet for railway cars to less than one foot in length for sacks. About three feet is the proper length

for bulk wagons and tanks or for probing sacks lengthwise. Three types are on the market as follows:

1. A brass tube with an inner sleeve to be closed after filling.

2. Similar to the above, except partitions are provided between the openings.

3. A brass tube with a wooden plunger.

Of the above, number 2 is to be most highly recommended. With it there is no chance of losing the wheat no matter how the trier is extracted and the grain can be separately examined for each opening. A canvas slightly longer than the instrument is needed to empty this type.

Number 3 does very well where there is plenty of room to properly remove it from the wheat. This cannot be done in heavily loaded cars. Care should be taken in withdrawing the wooden plunger after the trier is in place in the grain. If removed too quickly some of the lower holes may feed too slowly or not at all and the whole tube may be filled from those higher up. Such an occurrence naturally prevents the taking of a representative sample. With this type it is also nearly impossible to examine separately the grain at different depths.

Number 1 is the type least to be recommended. It does permit the removel of the tool without loss of grain but uniform filling thru all the holes is a matter of chance the same as when the wooden plunger is hurriedly withdrawn from number 3. It is likely to return a non-representative sample more frequently than either of the others.

DO YOU KNOW?

That the Idaho State Grain Inspector is licensed by the U. S. Department of Agriculture and his work is under their supervision?

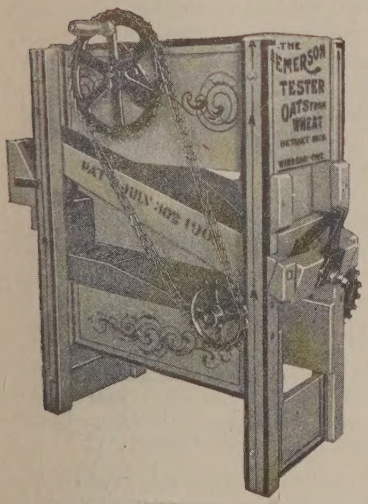
That you can ascertain the grade of your wheat by submitting a three-pint representative sample to the State Grain Inspector at Boise? A fee of one dollar is required.

That grades placed by him should be the same as those placed by any other licensed inspector in the United States?

That you have the privilege of demanding a State grade when you sell your wheat? See rules on page 3 of this bulletin.

That you need not be satisfied with an average grade on your high quality wheat?

DETERMINATION OF DOCKAGE AND SMUT DOCKAGE.



THE COMMON TYPE OF "WILD OAT KICKER"

The Introduceion of Dockage during the season of 1917 as a consideration in the price of wheat led to many misunderstandings and much dissatisfaction. Obviously chaff, cobs, weed seeds and grains of other cereals cannot be made into flour. This material does have a value, however, as a feed for livestock and for some other purposes. The farmer has for years bought a large share of it back as feed after paying freight both ways. He had not realized previously how much he really sold along with his wheat. Under competitive conditions allowance was undoubtedly made for the value of this material when wheat was purchased by the millers. Only a general allowance could be made, however, and the farmer who marketed wheat practically free from dockage was actually **penalized** for so doing. In fairness the wheat and the dockage should be paid for on a different basis or the farmer should himself retain the dockage. Retention of this material directly on the farms is unquestionably the cheapest and best method for handling the situation.

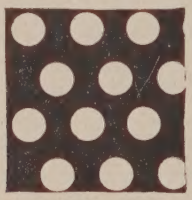
Who Should Remove the Dockage? Obviously there is some expense connected with its removal. To save hauling and expense the closer home it is done, the better. The farmer ordinarily has neither the equipment nor the time to do it himself. Many local dealers also have too small a volume of business to do the job efficiently and economically. **If the cost of cleaning is greater than the value of the dockage itself it had better be included directly with the wheat.** The value of the dockage found in any lot of wheat, the amount of that dockage, and the cost of removal must in all cases determine whether it shall be removed at the local station or shipped to the terminals in the wheat.

Value of Dockage. No arbitrary value can be placed on dockage. A sample containing a high percentage of barley is

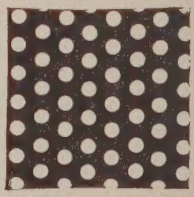
infinitely more valuable than another sample consisting largely of chaff and weed seeds. The actual value must be a matter of contract between the buyer and the seller. The cost of cleaning must likewise be governed by local practices.

Equipment Needed to Determine Dockage. Under ordinary Idaho conditions, the following will be sufficient:

1. A scalper sieve having round holes 12-64 inch in diameter.
2. A fine seed sieve having round holes 1-12 inch in diameter. The buckwheat and chess sieves will seldom be required.



SCALPER SIEVE.

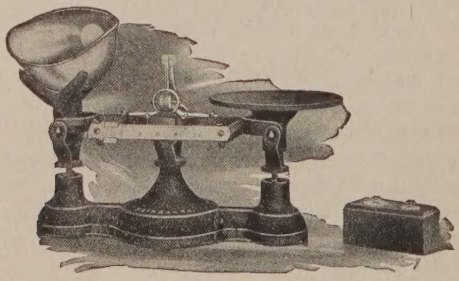


RECLAIMING SIEVE.

Showing the required size and shape of the perforations.
(Courtesy Seed Trade Reporting Bureau, Chicago.)

3. A small wheat cleaning machine commonly called the "wild oat kicker."

4. A balance weighing accurately to 1-10 of a gram. A trip balance is to be preferred to the beam scale as much more accurate results can be secured. **Use of the test weight per bushel kettle and beam should not be permitted**; it is too inaccurate. The weights purchased should read in grams rather than pounds for all grade determinations. By using a sample of 1000 grams (2.2 pounds) percentage can be figured by merely moving the decimal point one place to the left. For example, if 18.4 grams of dockage were found in 1000 grams of wheat, the percentage of dockage would be 1.84.



A TRIP BALANCE IS RECOMMENDED.

This type of balance is more accurate than the beam scale.
(Courtesy Seed Trade Reporting Bureau, Chicago.)

5. A scourer or washing machine for removing smut. Few dealers will probably be able to purchase machinery which will make the determination of smut dockage possible. Smutty samples should be submitted to the State Grain Inspector. Sample lots showing different percentages of dockage might prove convenient in the grain office.

Removal of the Dockage. The process may be tabulated as follows:

1. Weigh out accurately 1000 grams of the sample.

2. Remove leaves or other light material with the scalper sieve. The kicker, having no wind separation, will not remove material of this sort.

3. Run the sample thru the wild oat kicker. Care must be exercised to use the proper riddle or the separation will not be complete. Idaho wheats cannot be properly divided by the designation "spring wheat" and "fall wheat" for the purpose of this separation. Size of kernel and experience must determine the proper riddle to use. Wheat kernels kicked over with the dockage should be picked out and returned to the wheat.

4. Reclaim the dockage found in the bottom tray by running it over the small seed sieve. The sieve should be held at an angle of 20 degrees and gently tapped on one side to allow the material to flow across it. If 50 per cent or more of the material remaining on top of the sieve is wheat (cracked or otherwise) it should be returned to the wheat sample. If less than 50 per cent is wheat the entire amount should be included with the dockage.

5. Weigh the dockage and calculate the percentage on the **weight before removing the dockage.**

Dockage is expressed in whole per centum and anything below that amount should be ignored. Thus 0.8 per cent is not counted, while 1.8 per cent is called 1 per cent. Smut dockage is expressed in half per centum.

DETERMINATION OF THE PROPER CLASS AND SUBCLASS.

Variety Determines Class. The American wheats have all been grouped in certain classes based primarily on similarity in milling value. The following table presents in a graphic manner the proper class for the more important Idaho wheats. In addition a brief description is given of each variety, together with the subclass it usually takes.

CLASS, DESCRIPTION, AND SUBCLASS OF PRINCIPAL IDAHO WHEATS.

Hard Red Spring (Class I).

Variety	Fall or Spring	Beards	Head	Chaff	Kernel	Usual Subclass
Marquis	Spring	None	Tapering-dense	White-smooth	Short, square, blunt ends	Nor Spr.
Red (Scotch) Fife	Spring	None	Tapering-dense	White-smooth	Med. long, straight sides, med. pointed	Nor Spr.
Minn. 169	Spring	None	Long	White-velvet	Med. long, straight sides	Nor Spr.

Durum (Class II).

Kubanka	Spring	Long	Massive-dense	White-smooth	Amber, large, straight sides	Durum

Hard Red Winter (Class III).

Turkey Red	Fall	Medium	Loose	White-smooth	Angular with sharp back, pointed	Hard Win.

Crimean and Kharkov are the same as Turkey. Beloglina and Kanred similar, but a different strain.

Soft Red Winter (Class IV).

Jones Winter Fife	Fall	None	Very open	White-velvet	Large, full, soft to semi-hard	Red Win.
Fultz	Fall	None	Tapering-open	White-smooth	Large, full, soft to semi-hard	Red Win.
Odessa	Fall	None		Brown-smooth	Large, full, soft to semi-hard	Red Win.
Red Cross	Fall	None	Oblong-dense	White-smooth	Large, full, soft to semi-hard	Red Win.
Red Russian	Fall	None	Oblong-dense	White-smooth	Very large, full and soft	Red Walla
Hybrid 108	Both	None	Club	White-smooth	Dumpy, distorted	Red Walla
Hybrid 123	Both	None	Club	White-smooth	Dumpy, distorted	Red Walla

Common White (Class V).

Pacific Blue-stem	Both	None	Tapering-open	White-smooth	White to amber, pear shape	Soft white
Dicklow	Spring	None	Oblong-dense	White-smooth	Short, round, deep crease, flat cheeks	Soft white
Forty Fold (Gold Coin)	Fall	None	Open and loose	Brown-smooth	Straight sides, med. long	Soft white
Early Baart	Spring	Med.	Loose	White-smooth	Amber, large, long, angular	Hard white
Defiance	Spring	None	Tapering-open	White-smooth	Nearly like Dicklow, longer.	Soft white
Colorado Special	Spring	None	Broad-med. dense	White-smooth	Rather small to medium size	Soft white

White Club (Class VI).

Sonora	Spring	None	Oblong	Red-velvet	Creamy white, small, pointed	Wh. Club
Red Chaff Club	Both	None	Club	Red-smooth	White and distorted	Wh. Club
Little Club	Both	None	Club	White-smooth	White and distorted	Wh. Club

Jenkins Club, Hybrid 128, Hybrid 143, and Salt Lake Club are other varieties of White Club Wheat. Some of these have oblong heads rather than club heads but the general description is quite similar to that of Little Club. Some differences are also found in the shape and size of kernels, but all are characteristically distorted.

Alaska wheat holds no classification whatever.

The above table considers only typical specimens and some variations are bound to occur. There is a difference between tip kernels and those developed farther down on the head. Beginners often place these tip kernels of the white wheats in the white club class. Such a grouping is plainly unfair to the sample analyzed. Differences will also be found in the shape of heads and in the texture and color of kernels of the same variety. Red kernels do not develop from white grains, however.

COMMON IDAHO WHEATS.

Reading from **right** to **left.**

1. Dicklow.
2. Pacific (Palouse) Bluestem.
3. Forty Fold (Gold Coin).
4. Early Baart.
5. Marquis.
6. Turkey Red.
7. Jones Winter Fife.
8. Red Russian
9. Sonora.
10. Washington Hybrid No. 123.
11. Little Club.
12. Jenkins Club.

It will be noticed that many varieties are grouped together in the same class. This fact does not mean, however, that it is desirable to mix those varieties indiscriminately. Under normal competitive conditions a better price will undoubtedly be paid for lots made up of the same variety. The milling value of any two wheats is not the same and a knowledge of that fact is of immense value to the miller. It is true that wheats are usually blended before being ground into flour, but this blending must be done carefully and exactly. Uniformity is a necessity for the successful miller and this requirement can be truly obtained only when the miller himself does all the blending of the different wheats. Community specialization on one variety is needed to establish a higher reputation for Idaho as a wheat producing state.

The Subclass is not always so easily determined except in the case of the Soft Red Winter and the White Club classes. In both of these the variety not only determines the class but also the subclass. In the remaining four classes "texture," or quality, decides the proper subclass.

By "Texture" is meant the relative hardness or, in other words, the gluten content of the wheat. The harder wheats contain a higher percentage of gluten and hence are more valuable for bread making purposes. Gluten content seems to be largely dependent on the amount of available nitrogen found in the soil. Idaho soils are notoriously low in this important element. Thru the use of a crop rotation which includes a maximum amount of leguminous crops, such as alfalfa, clover, peas and beans, it is quite possible that Idaho is capable of producing as high a quality of wheat as is found in North America. There are too many farmers at present, however, who do not have a soil of the required nitrogen content to make it possible for them to grow a high quality hard wheat. Lots of such wheat mixed with the really good lots will reduce the quality for the whole community. Bearing these facts in mind it will probably be advisable, for the present at least, to limit the area of the hard red spring wheats. Turkey Red has proven to be the best dry land wheat both as to quality and yield.

In regard to texture, the hard red wheats may be "dark, hard and vitreous" or they may be "yellow." The latter type of kernels are lower in gluten and bread making quality. Wheat badly affected with "yellow berry" makes only a mediocre flour. The hard red classes are, therefore, divided into three groups based on this factor. A kernel is considered "yellow" if it has one large yellow mark or one small mark on each cheek. A berry carrying only one very small yellow spot is considered "dark, hard and vitreous."

The white wheats may be "hard" or they may be "soft and chalky." A similar difference in quality and gluten content exists with them as with the hard red wheats. Pacific Bluestem has frequently been incorrectly classed as "hard" by local dealers. As a matter of fact, this variety seldom classes as anything but "soft white." Early Baart is the only white wheat which consistently classes as "hard white."

The subclass can usually be readily determined. If any doubt exists it becomes necessary to weigh out 30 to 50 grams for hand separation. It should be borne in mind that the harder kernels have a horny appearance and when cut in two appear glassy rather than white. It is always a good plan to cut a number of berries in order to gain an accurate idea of their relative quality.

ASSIGNMENT OF THE CORRECT GRADE.

After the dockage has been removed and the proper subclass assigned, the grade will depend on five factors. They are:

1. The test weight per bushel.
2. The percentage mixture of wheat of other classes.
3. The moisture content.
4. The percentage of damaged kernels.
5. The percentage of foreign material other than dockage.

ALL OF THE ABOVE DETERMINATIONS ARE MADE AFTER THE REMOVAL OF THE DOCKAGE.

Test Weight Per Bushel. In times past each dealer used his own individual method for determining the test weight per bushel. Naturally many different systems were used and the results were not uniform. A difference of two or three pounds per bushel can readily be made by varying the manner in which the kettle is filled. Idaho dealers have been found who were unquestionably getting too low a test weight per bushel. Other dealers have been found who were getting too high a test. In the former case the farmers lost, while in the latter the dealers lost. Such conditions should be remedied.

TEST WEIGHT PER BUSHEL OUTFIT.

Such an outfit is accurate, convenient, and practical. They are recommended where the volume of business warrants the expense.

For the purpose of eliminating the effect of individual methods as completely as possible, and to insure uniformity under all conditions certain definite rules have been formulated for making this test. Listed in order of performance they appear as follows:

1. The test weight per bushel must be made after the removal of dockage (but not smut dockage).

2. The same size sample should always be used. Approximately 1000 grams (2.2 lbs.) have been found to give the proper overflow for the quart kettle. Uniformity of overflow insures uniform packing of the wheat in the kettle.

3. The kettle should always be filled from a funnel and under such conditions that both are solid during the operation. The required opening of the funnel is 1¼ inches and the height above the top of the kettle is 2 inches.

4. Three zigzag motions should be used in stroking off the kettle. The movement should be away from the person making the stroke.

A round-edged hardwood stick should be used for the stroke. Care is needed to hold it vertical. **Use of the balance beam is not permissible**; it will gouge out too much wheat and hence reduce the weight.

5. A balance reading to tenths of a pound is needed for accurate work.

The quart kettle is the size used in the federal supervision offices and it is recommended for average conditions. The pint kettle is subject to too many errors and the two-quart kettle is bunglesome.

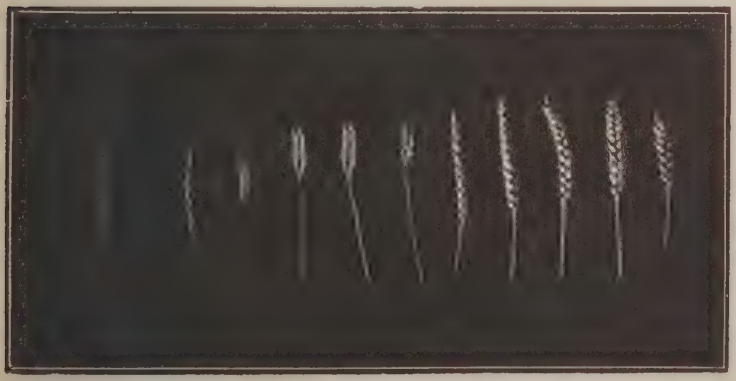
Standard test weight per bushel outfits are being manufactured and are to be recommended where the volume of trade justifies the expense. These outfits consist of a solid stand, a funnel, a kettle, and a double beam scale graduated to tenths of a pound.

Funnels made to use with any standard kettle can be purchased at small expense. These give practically as good results as the larger outfits. They are more inconvenient, however, and are subject to more variations due to shaking and other causes.

A home made funnel can be designed and fastened to the wall if desired. Great care is needed to make all the measurements exactly as required by the rules.

Percentage Mixture of Wheat of Other Classes. Idaho is a state of many different wheat varieties. Naturally mixtures of all kinds occur and these are the cause of countless difficulties. Numerous disputes have arisen over the true classi-

fication of certain red kernels found in the white wheats. This condition has been especially true in the areas where Dicklow wheat is grown. This variety has a tendency to produce kernels which are not truly white, but have a pinkish color. These kernels may have been classed as red by some inspectors. As a matter of fact, the writer has failed to locate any fields (except a few which had been head selected) of this wheat where red-kerneled mixtures were not found growing with the white wheat. Such kernels have undoubtedly been justly classed as red and will be so classed in the future. The whole proposition comes down to a question of eliminating a large number of the wheats now grown together with a more careful selection of those that are retained.



ONE REASON WHY WHEAT IS GRADED.

The heads shown above were all picked from a single field of Dicklow wheat. Common White, White Club, Hard Red Spring, and Red Walla are the classes shown. Mixtures like this are common.

Great care is needed to accurately determine the exact percentage of other classes found in any given sample of wheat. This percentage is one of the most important factors in determining the true grade designation. Where the wheats are practically pure a casual examination may be sufficient. Much of the time, however, it will be necessary to hand pick a small sample. For this purpose 25 to 60 grams are ordinarily used; the lower figure being the minimum amount which will give reasonable accuracy.

Where much hand picking is necessary special arrangements should be provided. These include a glass or white paper covered table, tweezers, and a few plates or tins. This outfit should be placed so as to receive a north light. Windows on

the other sides of a building are subject to too many changes in the intensity of the light and uniform results cannot be expected.

Mixtures to Avoid. Two percentum of Durum mixed with any other class of wheat will lower the grade below number one. From three to five per centum, depending on the class, will reduce the grade to number three. The texture and flour making qualities of Durum wheat are quite different from the other classes and serious difficulties are encountered in milling such mixtures. It has, therefore, been classed as a "penalty" mixture. Considering the difficulty of keeping varieties from becoming mixed it would seem to be good policy to entirely abandon the growth of Durum wheat in the state. Not only is this advisable from the standpoint of improving the grade of our common wheats but at least three other classes of wheat act as penalty mixtures when mixed with the Durum. Once the dangers of these mixtures are fully understood it should not be difficult to completely eliminate a trouble maker of this sort.

HEADS GATHERED IN A FIELD OF EARLY BAART.

Hard White, Soft White, White Club, and Red Winter are represented. Wheat mixed in this manner cannot be expected to grade satisfactorily.

A two per centum mixture of common white or white club wheat will reduce the grade of either hard red spring or hard red winter below number one. Five per centum will reduce the grade to number three. In spite of this condition we are continually trying to grow these wheats not only in the same community but on the same farm. Mixtures are bound to occur. Frequently only small lots of one variety are grown and the local dealer either has to mix the two or dispose of the

smaller lot for seed or feed. Sustained community effort is needed for satisfactory work of this kind.

The Moisture Content of Idaho Wheat is almost invariably below the maximum allowed. Samples of lots which appear to be unusually damp can be sent to the State Grain Inspector for determination.

Damaged Kernels. The usual tendency is to pick too many damaged kernels. They should not be so called unless they will be of actual detriment to the flour. Ordinary shriveled kernels are not called damaged, but **green** shriveled kernels are injurious in milling and should be so designated.

Heat damage is differentiated from the other kinds as being especially detrimental. To be classed here, however, kernels must be distinctly dark brown or mahogany in color. Samples should be carefully examined for any trace of such damage.

Other kinds of damage may be listed as: Frosted, sprouted, moldy, weevil-bored, and black tipped kernels. A slight touch of frost may not be injurious, but if both cheeks of the berry are distinctly scaly or wrinkled or hoary a bitter flavor will be imparted to the resulting flour.

In weevil-bored kernels it is assumed that the insects are all dead. If live weevils are found the sample is graded as "weevilly."

Black tipped kernels discolor the flour.

Foreign Material Other Than Dockage. To accurately determine the amount of such material a regular 25 to 60 gram sample of the dockage-free wheat should be used. The percentage is calculated by weight. Ordinarily wheat does not carry a high enough percentage under this head to affect the grade.

Two divisions are made under foreign material other than dockage. Cereal grains mainly consist of hulless barley, rye and groats (hulled oats). These impurities are quite detrimental in milling. Matter other than cereal grains may include cobs, chaff, weed seeds including wild oats, pieces of weed stems and other light substances. Stones are extremely injurious and a lot containing these will be graded "sample."

How the Grade Designation Is Written. The order in which a grade is usually reported by licensed inspectors is as follows:

1. Grade number or other designation.
2. Subclass.
3. Smut dockage.
4. Dockage.
5. Test weight per bushel.
6. Reasons for grading below number one.

Thus: Number 2, Soft white, Smut dkg. 2 per cent, Dkg. 1 per cent, Test weight per bushel 60, graded No. 2 on account of 6 per cent wheat of other classes, is an example of the usual method of making returns. Special rules apply to mixed wheat, sample grade, and the other special cases provided for.

LAW UNDER WHICH THE FEDERAL GRAIN STANDARDS ARE APPLIED TO IDAHO.

The State Director of Farm Markets has the power to fix such just and fair grades for agricultural products in this state as he may deem advisable. The statutes particularly affecting the grading of wheat may be quoted as follows:

Laws passed and amended by the 14th session of the State Legislature:

CHAPTER 24
HOUSE BILL NO. 63.
AN ACT

To Provide for the Creation of the Office of Director of Farm Markets, and Defining His Duties and Powers.

Sec. 6. The duties and powers of the Director shall be as follows: Subdivision e. To help improve country life and to provide, as far as is in his power, equality of opportunity for the farmers of the State.

m. Whenever any standard for the grade or other classification of any farm product becomes effective under this Act, no person thereafter shall pack for sale, offer to sell or sell within this State any such farm product to which such standard is applicable unless it conforms to the standard subject to such reasonable variations therefrom as may be allowed in the rules and regulations made under this Act;

Provided, That any farm product may be packed for sale, offered for sale or sold without conformity to the standard or grade or other classification applicable thereto if it is not specifically described as state graded or packed under state standard, in accordance with such regulations as the Director may prescribe.

n. Upon application of any owner or person, firm, corporation or association in charge of farm products, the Director is authorized to appoint, license or designate persons to inspect and classify such farm products and to certify as to the grade or other classification thereof, in accordance with the standards made effective under this Act, and shall fix, assess and collect or cause to be collected the fees for such services. Whenever, after opportunity for a hearing is afforded to any

person appointed, licensed or designated under this section, it is determined by the Director that such person has failed to classify farm products correctly, in accordance with the standards established therefor under this Act, or has violated any provision of this Act or the rules and regulations made hereunder, the Director may suspend or revoke the appointment, license or designation of such person. Pending investigation, the Director may suspend or revoke any such appointment, license or designation temporarily without hearing.

o. The owner or person in possession of any farm product classified in accordance with subdivision "n" of this Section of this Act may appeal from such classification to the Director, under such rules and regulations as the Director may prescribe, who shall issue a certificate of the grade or other classification thereof.

p. A certificate of the grade or other classification of any farm product issued under this Act shall be accepted in any court of this State as prima facie evidence of the true grade or other classification of such farm product at the time of its classification.

q. Any person, firm, corporation or other organization who violates any provision of this Section of this Act or of the rules and regulations made under this Act for carrying out the provisions of this section, fails or refuses to comply with any requirements of this section or who wilfully interferes with the Director, his agents or employes in the execution or on account of the execution of his or their duties under this section, shall be guilty of a misdemeanor.

A LIST OF USEFUL REFERENCES.

"Official Wheat and Corn Standards," Service and Regulatory Announcements No. 33, U. S. Department of Agriculture.

"Performance Records of Some Eastern Wheats in Idaho," Idaho Agricultural Experiment Station Bulletin No. 103, Moscow, Idaho.

"A Report on the Milling Properties of Idaho Wheat," Idaho Experiment Station Bulletin No. 72, Moscow, Idaho.

"Dry Farmed and Irrigated Wheat," Idaho Agricultural Experiment Station Bulletin 88, Moscow, Idaho.

"Varieties of Hard Spring Wheat," Farmers' Bulletin No. 680.

Washington Wheats," State College of Washington Bulletin No. 121, Pullman, Washington.

"Experiments with Marquis Wheat," U. S. Department of Agriculture Bulletin No. 400.

"The Quality of Home Grown vs. Imported Wheat," Utah Agricultural College Bulletin No. 137, Logan, Utah.

"The Properties of Colorado Wheat," Colorado Agricultural College Bulletin No. 237, Fort Collins, Colorado.

"Federal Grain Supervision and the Standards for Wheat Applied to 1917 Crop of Hard Red Spring Wheat, Including Comparison of Present and Revised Official Standards," Service and Regulatory Announcements No. 36, U. S. Department of Agriculture.

"The Wheat Standards and Their Application," Service and Regulatory Announcements No. 35, U. S. Department of Agriculture.

"Moisture Content and Shrinkage of Grain," Bureau of Plant Industry Circular No. 32.

"A Method for the Determining of Moisture in Grain," Bureau of Plant Industry Circular No. 72.

"Change in Weight of Grain in Arid Regions During Storage," Utah Bulletin No. 130.

"A Special Flask for the Rapid Determination of Water in Flour and Meal," Cox, United States Department of Agriculture Bulletin No. 56, 1914.

"A Device for Sampling Grain, Seeds, and Other Material," U. S. Department of Agriculture Bulletin No. 287.

"Milling and Baking Tests of Wheat Containing Admixtures of Rye, Corn Cockle, Kinghead and Vetch," U. S. Department of Agriculture Bulletin No. 328.

"The Intrinsic Values of Grain, Cottonseed, Flour and Similar Products, based on the Dry-Matter Content," U. S. Department of Agriculture Bulletin No. 374.

"The Drying for Milling Purposes of Damp and Garlicky Wheat," U. S. Department of Agriculture Bulletin No. 455.

"Improved Apparatus for Determining the Test Weight of Grain, with a Standard Method of Making the Test," U. S. Department of Agriculture Bulletin No. 472.

"Table for Converting Weights of Mechanical Separations into Percentages of the Sample Analyzed," U. S. Department of Agriculture Bulletin No. 516.

"A Comparison of Several Classes of American Wheats and a Consideration of Some Factors Influencing Quality," U. S. Department of Agriculture Bulletin No. 557.

"The Conversion of the Weights of Mechanical Separations of Corn, Wheat and Other Grains into Percentages," U. S. Department of Agriculture Bulletin No. 574.

"Opinions of General Interest Regarding Questions Arising Under the United States Grain Standards Act," Service and Regulatory Announcements No. 13.

"Regulation 2, Section 14, of the Rules and Regulations of the Secretary of Agriculture Under the United States Grain Standards Act," Service and Regulatory Announcements No. 15.

"Opinions of General Interest Regarding Questions Arising Under the United States Grain Standards Act," Service and Regulatory Announcements No. 18.

"Supervision Districts," Service and Regulatory Announcements No. 24.

"List of Inspectors Who Held Licenses on September 15, 1918, Which Were Issued by the Secretary of Agriculture, to Inspect and Grade Shelled Corn and Wheat, or Either Shelled Corn or Wheat, and to Certificate the Grade Thereof," Service and Regulatory Announcements No. 31.

"Have Farmers Had a Square Deal?" Service and Regulatory Announcements No. 34.

"Rules and Regulations," Office of the Secretary, U. S. Department of Agriculture, Circular No. 70 and Amendments 1, 2, 3 and 4.

Publications of the U. S. Department of Agriculture may be secured while they are available, by writing to the Editor in Chief, Division of Publications, U. S. D. A., Washington, D. C., or from your Senator or Representative in Washington, D. C., or from Chas. J. Brand, Chief, Office of Markets, U. S. D. A., Washington, D. C.

WHEAT GRADING SCHOOL AT TWIN FALLS.

UNITED STATES DEPARTMENT OF AGRICULTURE,
Bureau of Markets,
Washington, D. C.

STANDARDS FOR WHEAT

Tabulated and abridged description of the official grain standards of the United States for wheat under the United States Grain Standards Act, as established and promulgated by the Secretary of Agriculture April 13, 1918, effective July 15, 1918.
(Compiled from Service and Regulatory Announcements, Markets, No. 33, "Official Grain Standards of the United States for Wheat * * * .")

CLASSES AND SUBCLASSES. Wheat shall be divided into classes and subclasses, as follows:

HARD RED SPRING (CLASS I).

This class shall include all varieties of hard red spring wheat, and may include not more than 10 per centum of other wheat or wheats. This class shall be divided into three subclasses, as follows:

Dark Northern Spring. This subclass shall include wheat of the class Hard Red Spring consisting of 75 per centum or more of dark, hard and vitreous kernels. This subclass shall not include more than 10 per centum of wheat of the variety Humpback.

Northern Spring. This subclass shall include wheat of the class Hard Red Spring consisting of less than 75 per centum and more than 25 per centum of dark, hard and vitreous kernels. This subclass shall not include more than 10 per centum of wheat of the variety Humpback.

Red Spring. This subclass shall include wheat of the class Hard Red Spring consisting of not more than 25 per centum of dark, hard and vitreous kernels. This subclass shall also include wheat of the class Hard Red Spring consisting of more than 10 per centum of the variety Humpback.

DURUM (CLASS II).

This class shall include all varieties of durum wheat and may include not more than 10 per centum of other wheat or wheats. This class shall be divided into three subclasses, as follows:

Amber Durum. This subclass shall include wheat of the class Durum consisting of 75 per centum or more of hard and vitreous kernels of amber color. This subclass shall not include more than 10 per centum of wheat of the variety Red Durum.

Durum. This subclass shall include wheat of the class Durum consisting of less than 75 per centum of hard and vitreous kernels of amber color. This subclass shall not include more than 10 per centum of wheat of the variety Red Durum.

Red Durum. This subclass shall include wheat of the class Durum consisting of more than 10 per centum of the variety Red Durum.

HARD RED WINTER (CLASS III).

This class shall include all varieties of Hard Red Winter wheat, and may include not more than 10 per centum of other wheat or wheats. This class shall be divided into three subclasses, as follows:

Dark Hard Winter. This subclass shall include wheat of the class

Hard Red Winter consisting of 80 per centum or more of dark, hard and vitreous kernels.

Hard Winter. This subclass shall include wheat of the class Hard Red Winter consisting of less than 80 per centum and more than 25 per centum of dark, hard and vitreous kernels.

Yellow Hard Winter. This subclass shall include wheat of the class Hard Red Winter consisting of not more than 25 per centum of dark, hard and vitreous kernels.

SOFT RED WINTER (CLASS IV).

This class shall include all varieties of soft red winter wheat, also red club and red hybrid wheats of the Pacific Northwest, and may include not more than 10 per centum of other wheat or wheats. This class shall be divided into two subclasses, as follows:

Red Winter. This subclass shall include wheat of the class Soft Red Winter consisting of both light and dark colored kernels. This subclass shall not include more than 10 per centum, either singly or in any combination, of Red Russian, red clubs, red hybrids, and other soft red winter wheats possessing the characteristics of those varieties as grown west of the Great Plains area of the United States.

Red Walla. This subclass shall include wheat of the class Soft Red Winter consisting of more than 10 per centum, either singly or in any combination, or Red Russian, red clubs, red hybrids, and other soft red winter wheats possessing the characteristics of those varieties of those varieties as grown west of the Great Plains area of the United States.

COMMON WHITE (CLASS V).

This class shall include all varieties, except Sonora, of common white wheat, whether winter or spring grown, and may include not more than 10 per centum of other wheat or wheats. This class shall be divided into two subclasses, as follows:

Hard White. This subclass shall include wheat of the class Common White consisting of 75 per centum or more of hard (not soft and chalky) kernels.

Soft White. This subclass shall include wheat of the class Common White consisting of less than 75 per centum hard (not soft and chalky) kernels.

WHITE CLUB (CLASS VI).

This class shall include all varieties and hybrids of white club wheat, and the common white wheat known as Sonora, and may include not more than 10 per centum of other wheat or wheats.

(The numbered footnotes below must be read in connection with the tabulation.)

Grade No.	Minimum limits of—			Maximum limits of—						
	Test weight per bushel.			Moisture.		Damaged kernels.		Foreign material other than dockage.		Wheat of other classes.
	Class Hard Red Spring.	Classes Durum, Hard Red Winter, Common White, and White Club; and subclass Red Winter.	Subclass Red Walla.	Classes Hard Red Spring, and Durum.	Classes Hard Red Winter, Soft Red Winter, Common White, and White Club.	Total.	Heat damage.	Total.	Matter other than cereal grains.	Total.
	Pounds	Pounds	Pounds	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
1	58	60	58	14.0	13.5	2	0.1	1	0.5	5
2	57	58	56	14.5	14.0	4	0.2	2	1.0	10
3	55	56	54	15.0	14.5	7	0.5	3	2.0	10
4	53	54	52	16.0	15.5	10	1.0	5	3.0	10
5	50	51	49	16.0	15.5	15	3.0	7	5.0	10
*Sample										

*SAMPLE GRADE.—Shall be wheat of the appropriate subclass which does not come within the requirements of any of the grades from No. 1 to No. 5, inclusive, or which has any commercially objectionable foreign odor, except of smut, garlic, or wild onions, or is very sour, or is heating, hot, infested with live weevils or other insects injurious to stored grain, or is otherwise of distinctly low quality, or contains small inseparable stones or cinders.

(1) The wheat in grade No. 1 shall be bright.

(2) The wheat in grades Nos. 1 to 4, inclusive, shall be cool and sweet.

(3) The wheat in grade No. 5 shall be cool, but may be musty or slightly sour.

(4) The wheat in grade No. 1 Dark Northern Spring and grade No. 1 Northern Spring may contain not more than 5 per centum of the hard red spring wheat variety Humpback.

(5) The wheat in grade No. 1 Amber Durum and grade No. 1 Durum may contain not more than 5 per centum of the durum wheat variety Red Durum.

(6) For each of the subclasses of the class Durum, grade No. 1 and grade No. 2, may contain not more than 2 per centum and 5 per centum, respectively, of soft red winter, common white, and white club wheat, either singly or in any combination.

(7) For each of the subclasses of the classes Hard Red Spring and Hard Red Winter, grade No. 1 and grade No. 2, may contain not more than 2 per centum and 5 per centum, respectively, of common white, white club, and durum wheat, either singly or in any combination.

(8) For each of the subclasses of the classes Soft Red Winter, Common White, and White Club, grade No. 1 and grade No. 2, may contain not more than 2 per centum and 3 per centum, respectively, of durum wheat.

DEFINITION OF TERMS.

For the Purposes of the Official Grain Standards of the United States:

Wheat. Any grain which, when free from dockage, contains more than 10 per centum of grain of a kind or kinds other than wheat shall not be classified as wheat. The term "wheat" in these standards shall not include emmer, spelt, and einkorn.

Basis of Determinations. Each determination of dockage, moisture, temperature, odor, onions, garlic, and live weevils or other insects injurious to stored grain shall be upon the basis of the grain including dockage. All other determinations shall be upon the basis of the grain when free from dockage.

Percentages. Percentages, except in the case of moisture, shall be percentages ascertained by weight.

Percentage of Moisture. Percentage of moisture in wheat shall be that ascertained by the moisture tester and the method of use thereof described in Circular No. 72, and supplement thereto, issued by the United States Department of Agriculture, Bureau of Plant Industry, or ascertained by any device and method giving equivalent results.

Test Weight Per Bushel. Test weight per bushel shall be the weight per Winchester bushel as determined by the testing apparatus and the method of use thereof described in Bulletin No. 472, dated October 30, 1916, issued by the United States Department of Agriculture, or as determined by any device and method giving equivalent results.

Dockage. Dockage includes sand, dirt, weed seeds, weed stems, chaff, straw, grain other than wheat, and any other foreign material, which can be removed readily from the wheat by the use of appropriate sieves, cleaning devices, or other practical means suited to separate the foreign material present; also undeveloped, shriveled, and small pieces of wheat kernels removed in properly separating the foreign material, and which can not be recovered by properly rescreening or recleaning. The quantity of dockage shall be calculated in terms of percentage based on the total weight of the grain including the dockage. The percentage of dockage so calculated, when equal to 1 per centum or more, shall be stated in terms of whole per centum; and when less than 1 per centum shall not be stated. A fraction of a per centum shall be disregarded. The percentage of dockage, so determined and stated, shall be added to the grade designation.

Foreign Material Other Than Dockage. Foreign material other than dockage shall include all matter other than wheat which is not separated from the wheat in the proper determination of dockage, except as provided in the case of smutty wheat.

Cereal Grains. Cereal grains shall include rye, barley, emmer, spelt, einkorn, corn, grain sorghums, oats, and rice, only, and shall not include buckwheat, flaxseed, and wild oats.

Heat-damaged Kernels. Heat-damaged kernels shall be kernels and pieces of kernels of wheat which have been distinctly discolored by external heat or as a result of heating caused by fermentation.

Treated Wheat. Treated wheat shall be wheat of which more than 10 per centum has been scoured, limed, washed, or treated in any similar manner.

Garlicky Wheat. Garlicky wheat shall be all wheat which has an unmistakable odor of garlic or wild onions, or which contains garlic or wild onion bulblets in a quantity equal to one or more bulblets in 1,000 grams of wheat.

Smutty Wheat. Smutty wheat shall be all wheat which has an unmistakable odor of smut, or which contains spores, balls, or portions of balls, of smut, in excess of a quantity equal to two balls of average size in 50 grams of wheat.

Mixed Wheat. Mixed wheat shall be any mixture of wheat not provided for in the classes from I to VI, inclusive.

Grades for Mixed Wheat. Mixed wheat shall be graded according to each of the grade requirements common to all of the subclasses of the class of the wheat which predominates over each other class in the mixture, except that (1) all of the grade requirements in any subclass as to the maximum percentage of other wheat or other varieties of wheat shall be disregarded, and (2) when soft red winter wheat so predominates, the grade requirements as to test weight per bushel shall be those of the subclass Red Winter. The grade designation of mixed wheat shall include, successively, in the order named, the number of the grade or the words "Sample Grade," as the case may be, the word "Mixed," and, in the order of its predominance, the name and approximate percentage of each class of wheat which constitutes 10 per centum or more of the mixture, but if only one class exceeds 10 per centum of the mixture, the name and approximate percentage of that class shall be added to the grade designation followed by the name and approximate percentage of at least one other class.

Grades for Treated Wheat. Treated wheat shall be graded and designated according to the grade requirements of the standard applicable to such wheat if it were not treated, and there shall be added to, and made a part of, its grade designation of statement indicating the kind of treatment.

Grades for Garlicky Wheat. Garlicky wheat shall be graded and designated according to the grade requirements of the standard applicable to such wheat if it were not garlicky, and there shall be added to, and made a part of, its grade designation the word "Garlicky."

Grades for Smutty Wheat. Smutty wheat shall be graded and designated according to the method either in paragraph (a) or paragraph (b) of this section.

(a) Before the determination of smut dockage as provided in this paragraph, the wheat shall be graded and designated according to the grade requirements of the standard applicable to such wheat if it were not smutty, except that smut balls shall not be considered as foreign material other than dockage. The loss in weight caused by the removal of smut from the wheat shall be ascertained by scouring, washing, or otherwise, and shall be calculated in terms of percentage based on the total weight of the grain free from dockage. The percentage so calculated shall be stated in terms of whole per centum and half percentum. A fraction of a percentum when equal to, or greater than, a half shall be treated as a half, and when less than a half shall be disregarded. The percentage of the "smut dockage," so calculated and stated, shall be added to the grade designation preceding the statement of dockage, if any.

(b) Smutty wheat shall be graded and designated according to the grade requirements of the standard applicable to such wheat if it were not smutty, except that (1) smut balls shall not be considered as foreign material other than dockage, and (2) when the amount of smut present is so great that any one or more of the grade requirements of the grades from No. 1 to No. 5, inclusive, can not be applied accurately, the wheat shall be classified as Sample Grade. For all grades there shall be added to, and made a part of, the grade designation, preceding the statement of dockage, if any, the word "Smutty."